of the DMT method can sweep over a very broad frequency band, ranging, e.g. from 300 kHz to 30 MHz, which is filled with evenly spaced carrier frequencies.

According to the frequency range standards that vary from one nation to the other, there are in practically every broad transmission spectrum prohibited ranges that are reserved for specific applications. These ranges may be occupied by amateur radio, emergency call or other well-known transmitters. It is therefore absolutely necessary to keep certain frequency ranges free in order not to interfere with the transmitting operation of these assigned ranges.

As already mentioned herein above, each subchannel is provided, in addition to a central major lobe, with side lobes that symmetrically drop about the carrier frequency.

In order to achieve sufficient suppression of a certain frequency range, it is not sufficient to use the subchannels within this range without modulation, which is also called zero charge of the subchannels, since the crosstalk arising in the neighboring channels on account of the low attenuation of the side lobes is so strong that the noise being emitted by said channels is still too strong to keep the desired fade-out range free. On account of the side lobes, the power density in this fade-out range then still has a value not to be neglected.

Accordingly, with the systems of the art, many of the channels neighboring the range to be kept free had to be left unmodulated in order to thus achieve a sufficient drop of the side lobes in the fade-out range. The disadvantage thereof is the high number of channels that have to be left unused, the overall frequency range of the method of transmission employed being relatively poorly exploited as a result thereof.

It is therefore the object of the present invention to indicate a method and a transmission system respectively by means of which the number of usable subchannels may be increased.

According to the invention, the solution of this object is achieved with a method as mentioned herein above in that a pulse for compensating the side lobes occurring in the fade-out range is additionally transmitted for each frequency range extending between the subcarriers contained

within the fade-out range and the thereto adjacent subcarriers having a zero charge respectively, said pulse being provided with a frequency spectrum which resembles the side lobes occurring in the intermediate ranges and which is modulated according to the data values of the side lobes occurring in the corresponding intermediate ranges, the compensating pulse(s) being transmitted orthogonal to the information transmitting subcarriers.

It may be shown that the amounts of the side lobes of each subchannel substantially only differ in the amplitude and in a constant phase offset. The interference caused in the fade-out range by any subchannel therefor has a spectrum which is similar to that of all the other interferences so that the resulting overall interference also resembles that of a side lobe.

In further developing the invention there may be provided that the amplitude and the phase of the side lobe spectra for the fade-out range be calculated from the data values of a number of subchannels that may be predetermined and the compensation pulse assigned to each intermediate frequency range is determined by adding the individual complex side lobe spectra that have been calculated for this purpose and that, prior to transmission, the thus determined compensation pulse(s) be superimposed to the transmitter signal in such a manner that the fade-out range is freed from interfering side lobes.

By subtracting a compensation pulse having the same amplitude frequency response and the same phase frequency response as the interference in the fade-out range, the interference spectrum in the fade-out range may be sufficiently reduced as to achieve the desired attenuation factor.

In a further development of the invention there may be provided that, except for the subcarriers contained in the fade-out range, only those subcarriers are zero charged that are located at the border of the fade-out range and, if need be, one or a few located directly outside the border of the fade-out range.

Accordingly, only one or a few of the subcarriers neighboring the border of the fade-out range are zero charged in addition to those subcarriers that are located within the fade-out range, so that only a very reduced number of subcarriers is left unmodulated, the number of subcarriers

that cannot be used for transmission being thus minimized as a result thereof.

The invention also relates to a method of suppressing narrow frequency bands in fade-out ranges during transmission of data by means of a multiple carrier method, e.g. DMT (Discrete Multitone) in which a predetermined broad frequency band is divided into a plurality of subchannels having subcarriers assigned thereto and in which the data to be transmitted are modulated in the transmitter with Inverse Discrete Fourier Transform (IDFT) and demodulated in the receiver with Discrete Fourier Transform (DFT), each subchannel being thus provided in the spectrum with a major lobe and several side lobes occurring in the region of nearby subcarriers.

It is the object of the invention to provide a method as mentioned above by means of which the number of subcarriers that can be used for transmitting information may be increased over conventional values, the technical expenditure required being thereby reduced.

According to the invention this object is achieved in that the side lobes occurring in these frequency intermediate ranges be calculated, and from them the required charge of the subcarriers contained in the fade-out range and of the subcarriers adjacent thereto, for each frequency range extending between the subcarriers contained in at least one fade-out range and the subcarriers adjacent thereto respectively in order to achieve a compensation of the side lobes occurring in the fade-out range and that the subcarriers contained in the fade-out range and the subcarriers adjacent thereto be transmitted with the computed charge, the remaining subcarriers being left unaltered.

In this way, compensation pulses must not first be devised and superimposed on the transmitter signal, the subcarrier charge of the normally zero charged subcarriers within the fade-out range and adjacent thereto may rather be adjusted in such a manner that compensation of the interfering side lobes is thereby made possible.

The invention also relates to a transmission system for transmitting data by means of a multiple carrier method, e.g. DMT (Discrete Multitone) and for suppressing at least one narrow fade-out